

Success Story – Elimination of Raw Human Sewage Discharges to a River Raisin Tributary

Lenawee Drain No. 70 is a small tributary to Big Meadow Creek in Palmyra Township, Lenawee County, Michigan. Water from Big Meadow Creek flows into Black Creek, joins with the River Raisin, and eventually enters Lake Erie. The Big Meadow Creek subwatershed is highly agricultural (83% of land cover) and has a population of about 1,800 people (NOAA, 2011; U.S. Census Bureau, 2010a, 2010b, and 2012). Most of the residents rely on septic systems to treat their waste, because there are no centralized sanitary sewer systems available.



Photo: Black Creek, a tributary to the River Raisin, in early spring. Water from Lenawee Drain No. 70 flows into this creek.

This stream was first placed on the federal Clean Water Act Section 303(d) list for raw sewage discharges and *E. coli* water quality standard (WQS) exceedances in 1998. Lenawee County officials had documented raw sewage discharges into Lenawee Drain No. 70 from 7-8 homes in the Manor Farms Subdivision since the mid-1960s. These homes were sharing a communal on-site septic system that was failing and discharging to the drain. Monitoring for Total Maximum Daily Load (TMDL) development found that the creek had a 30-day geometric mean *E. coli* concentration as high as 54,500 *E. coli* per 100 milliliters (mL) (420 times the WQS of 130 *E. coli* per 100 mL) and was continually measuring above the Partial Body Contact WQS of 1,000 *E. coli* per 100 mL (Table 1). In 2002, the United States Environmental Protection Agency approved the *E. coli* TMDL for Lenawee Drain No. 70 (Thelen, 2002).

Based on Michigan Department of Environmental Quality data collected in 2013 as follow-up for the TMDL, the water quality in Lenawee Drain No. 70 has vastly improved, and *E. coli* concentrations have been reduced to levels where the water now meets the Partial Body Contact WQS (Table 1). This improvement can be attributed to the Manor Farms Subdivision being connected to the Central Lenawee Wastewater Treatment Plant (completed in 2004) and therefore eliminating the failing septic system issue.

Reduction of *E. coli* levels is typically gradual, since there usually are multiple sources (e.g., failing septic systems, livestock issues, and pet and wildlife waste) which need to be addressed. While more work remains to be done to achieve the Total Body Contact WQS, this dramatic water quality improvement makes this creek and downstream areas safer for human contact.

Table 1. Comparison of pre- and post-remedy *E. coli* results (2001 and 2013) collected at the same location and similar weather conditions. Red cells indicate exceedances of the Partial and Total Body Contact daily WQS, and yellow cells indicate exceedances of the Total Body Contact WQS.

Lenawee Drain No. 70 - Humphrey Hwy - Downstream of Manor Farms Subdivision (Palmyra Twp)									
2001 - Before Sanitary Sewer					2013- After installation of Sanitary Sewer				
Date		Sample Results	Daily Geometric Mean	30-day Geometric mean	Date	Time	Sample Results	Daily Geometric Mean	30-day Geometric mean
7/17/2001	L	73,000			7/18/2013	L 8:40	690		
	C	68,000				C 8:40	950		
	R	112,000	82,227			R 8:40	920	845	
7/24/2001	L	3,700			7/25/2013	L 10:20	340		
	C	3,200				C 10:20	440		
	R	3,600	3,493			R 10:20	640	457	
7/31/2001	L	4,600			8/1/2013	L 8:45	290		
	C	4,700				C 8:45	290		
	R	4,400	4,565			R 8:45	350	309	
8/6/2001	L	3,900			8/8/2013	L 8:05	1,000		
	C	5,200				C 8:05	900		
	R	5,200	4,725			R 8:05	390	705	
8/14/2001	L	6,000			8/15/2013	L 8:00	250		
	C	5,800				C 8:00	220		
	R	6,200	5,998	8,204		R 8:00	140	197	441

Partial Body Contact Exceedances

Total Body Contact Exceedances

References:

NOAA. 2011. NOAA Coastal Change Analysis Program (C-CAP) Zone 51 (lower) 2011-Era Land Cover. Charleston, SC. National Oceanic and Atmospheric Administration. Accessed 2014.

Thelen, C. 2002. [Total Maximum Daily Load for Escherichia coli for Lenawee County Drain No. 70, Lenawee County](#). Michigan Department of Environmental Quality.

U.S. Census Bureau. 2010a. "Michigan TIGER/Line Shapefiles. 2010 Census Block Polygons for the State of Michigan."

U.S. Census Bureau. 2010b. "Michigan TIGER/Line Shapefiles. 2010 Census Tract Polygons for the State of Michigan."

U.S. Census Bureau. 2012. Census of Population and Housing, 2010 [United States]: Redistricting Data (Public Law 94-171) Summary File. C. B. United States Department of Commerce.